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## PATENT SPECIFICATION



Convention Date (France) : Nov. 20, 1923.

225,211

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Complete Accepted : May 21, 1925.

### COMPLETE SPECIFICATION.

#### Device for Delivering Molten Metal to Working Stations and Apparatus for the Manufacture of Glass Articles.

We, MANUFACTURES DES GLACES ET PRODUITS CHIMIQUES DE ST. GOBAIN, CHAUNY ET CIREY, of 1<sup>er</sup>, Place des Saussaies, Paris (8), France, a French 5 Société Industrielle, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

10 This invention relates to the manufacture of glass articles and consists of an improved device or arrangement for delivering the molten metal.

15 In the majority of cases the glass which has been melted and fined in a furnace cannot be worked or fashioned in the immediate vicinity of this furnace because of the radiation from the walls and from the working holes, and because

20 of the limited space available in the neighbourhood of the latter.

25 It is necessary in these cases to transfer the glass to a greater or less distance, either in the pots or crucibles in which it has been melted and fined or in ladles or cups, which fact involves numerous disadvantages:—Changes in the temperature of the glass, alteration of its quality and loss of homogeneity, non-utilisation of a

30 large percentage of the molten glass, wear of the plant, in particular of the crucibles subjected to substantial variations of temperature, cost of this plant and of the accessory installations, expense

35 of handling, etc.

On the other hand, it is difficult to vary rapidly in accordance with the requirements of manufacture (drawing, blowing, casting, moulding, etc.) the temperature 40 of the glass in the gathering zone of the furnace, that is to say, in the chamber where the glass is gathered by means of blow-pipes, ladles or cups, feeders or baits, or by running outlets, weirs etc.

45 A fortiori, it is not possible to manufac-

ture simultaneously articles requiring different gathering temperatures for the glass.

It has already been proposed, with a view to remedying these disadvantages, 50 to utilise auxiliary furnaces or gathering tanks, separate from the main melting furnace and each connected to the latter by a passage; but the latter not being heated had to be as short as possible in 55 order to obviate serious drawbacks, so that these auxiliary or gathering tanks could not be far removed from the main glass melting furnace.

It has likewise been proposed to heat 60 these auxiliary or gathering tanks, but by the usual means, for example by gas burners.

The present invention relates to a device of this kind, characterised by the 65 fact that the passage connecting each of these gathering tanks to the main melting furnace is, as well as the tank itself, heated by electrical heating methods, in such a way that each tank can be placed 70 in proximity to the corresponding glass working positions, at a certain distance from the main melting furnace, and be readily brought to and maintained at the proper temperature.

75 There may be utilised, as the electrical heating methods, heating by resistances traversed by primary currents, induction by currents of medium or high frequency, etc.

This heating can be carried out either 80 by means of a single apparatus or by several distinct apparatus acting independently of one another upon given portions of the connecting passages and of 85 the gathering tanks, variations produced at will in the voltage, current-intensity or frequency of the heating current allowing of producing in turn corresponding variations in the temperature of the part 90.

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heated and therefore of the glass contained therein.

The accompanying sheet of drawings represents several methods of carrying out the present invention.

Figure 1 is a view in longitudinal vertical section through a glass furnace with gathering tank, according to a first form of construction.

10 Figure 2 is a corresponding view of a modification.

Figure 3 is a partial view in plan of a glass furnace with several gathering tanks.

15 Figure 4 is a view, corresponding to those of Figures 1 and 2, of another modification.

In the example represented in Figure 1, A is a glass furnace or plate-glass furnace heated by any suitable method; B is a gathering tank; C a passage made of refractory material, leading the molten metal from the furnace A to the tank B; D is a covering, made of graphite or other refractory and conducting material, surrounding the passage C and the tank B, and serving as a heating wall (this covering can be suppressed when the glass is at a temperature such that it is sufficiently conductive); E is a second covering of heat-insulating material surrounding the first; F a coil or solenoid, wound around the covering E, and formed by a tube of copper or other conducting material, traversed by high frequency current and cooled by water circulation; G a metallic cage connected to earth and serving as a protecting sheath.

40 In the modification represented in Figure 2, the coil F is divided into sections F<sup>1</sup> F<sup>2</sup> F<sup>3</sup> F<sup>4</sup> . . . . . adapted to be traversed by currents of different voltage, intensity or frequency, the covering D being likewise divided 45 into sections D<sup>1</sup> D<sup>2</sup> D<sup>3</sup> D<sup>4</sup> . . . . .

45 In the example of construction shown in Figure 3, the furnace A is connected to several gathering tanks B<sup>1</sup> B<sup>2</sup> B<sup>3</sup> . . . . . by passages C<sup>1</sup> C<sup>2</sup> C<sup>3</sup> . . . . . 50 . . . . . heated as has been stated above and each comprising an insulating casing E<sup>1</sup> E<sup>2</sup> E<sup>3</sup> . . . . . and a metallic protecting cage G<sup>1</sup> G<sup>2</sup> G<sup>3</sup> . . . . .

55 These tanks may have any suitable shapes to allow of gathering the glass by the aid of blow-pipes, ladles, feeders or baits, by discharge orifices, weirs or any other device.

60 In the modification according to Figure 4, the lading or working holes H of the gathering tank B are extended by tubes I which dip into the bath of metal, thus allowing by means of an orifice K 65 opening above the level of the mass of

molten metal and a pipe L connected to this orifice, either the creation of any desired gaseous atmosphere above the surface of the bath, or the maintenance therein of a given pressure or depression suitable for the working of the glass, leakage being thus better prevented than if the tank were closed by the ordinary tile stoppers.

7 It is to be understood that the forms of construction described and represented have been given only by way of examples of the invention and that without departing from the principle of the invention modifications may be made in the shape and dimensions of the tanks, in the shape, dimensions and particularly the length of the passages connecting the latter to the furnace, as well as in the electrical heating apparatus allowing of producing the desired temperatures in the glass at the different points where it is contained in these passages and tanks, in such a way as to impart to it the desired fluidity at each of these points.

8 Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

9 1. A device for delivering molten metal to working stations and apparatus for the manufacture of glass articles, in which the gathering of the glass takes place in one or more tanks, separate from the melting and fining furnace, characterised by the fact that the passage connecting each of these gathering tanks to the furnace is, as well as the tank itself, heated by electrical heating methods, in such a way that each tank can be placed in proximity to the corresponding glass working positions at a certain distance from the melting furnace and be readily brought to and maintained at the proper temperature.

10 2. The division of the heating device into several separate sections acting independently of one another upon given parts of the gathering tanks and of the passages which connect them to the furnace.

11 3. The heating by induction of the gathering tanks and of the passages which connect them to the furnace, by means of currents of medium or high frequency traversing solenoids coiled around these tanks and passages, preferably with interposition of coverings made of refractory and conductive material acting as heating walls, the solenoids and the heating walls being if desired divided into several distinct sections traversed by currents of different voltage, intensity or frequency.

12 4. A form of construction of the device

according to Claim 1, characterised by  
the fact that the working holes of the  
gathering tank are extended by tubes  
dipping into the bath of metal, and by  
5 the fact that the tank is connected above  
the level of this bath of metal, to a pipe  
allowing of creating any desired gaseous  
atmosphere above the surface of the bath  
or of subjecting the latter to a given  
pressure or depression suitable for the 10  
working of the glass.

Dated this 17th day of November, 1924.

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[This Drawing is a reproduction of the Original on a reduced scale]

Fig.1.

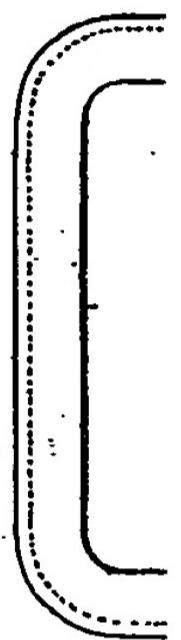
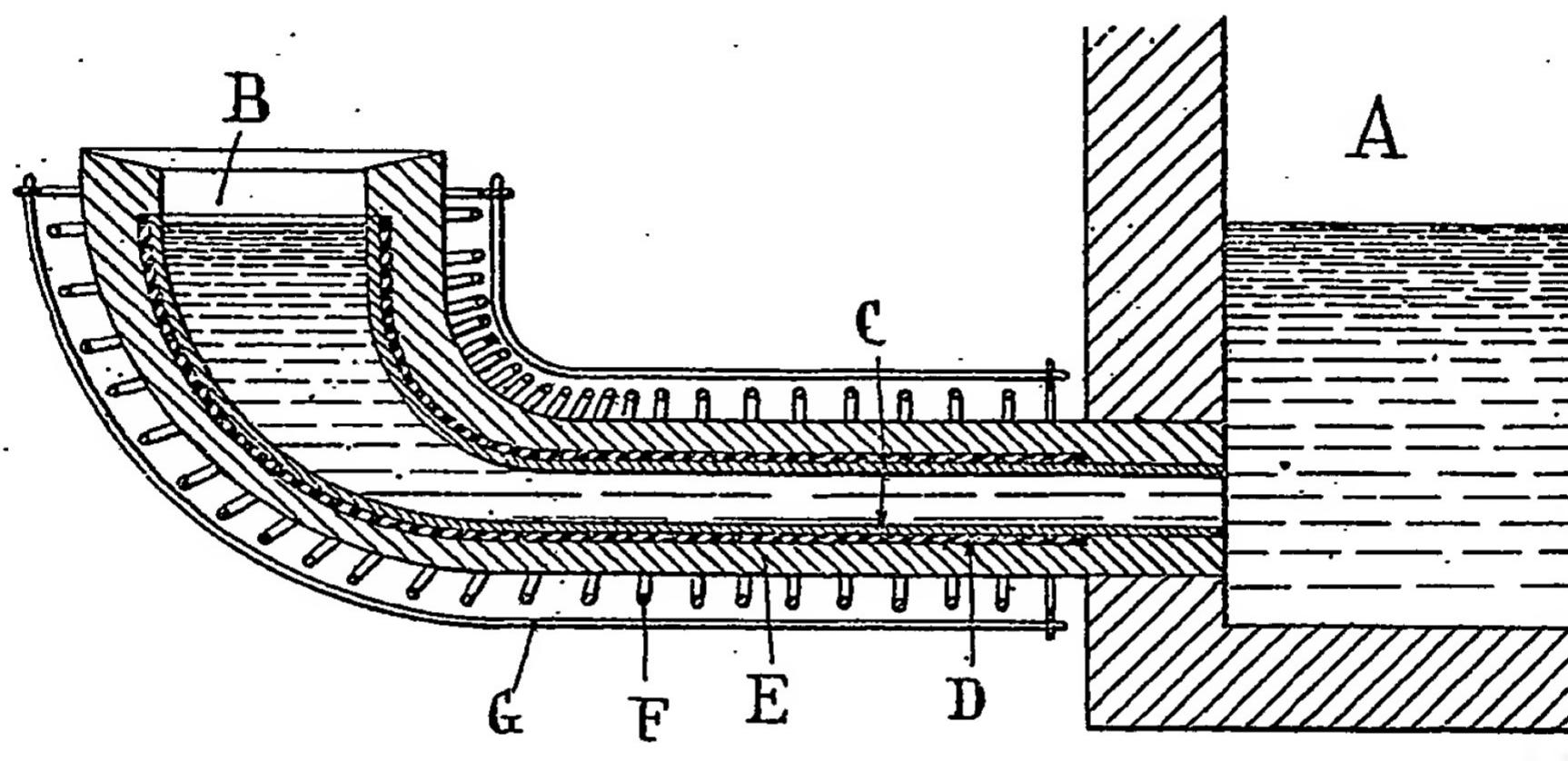
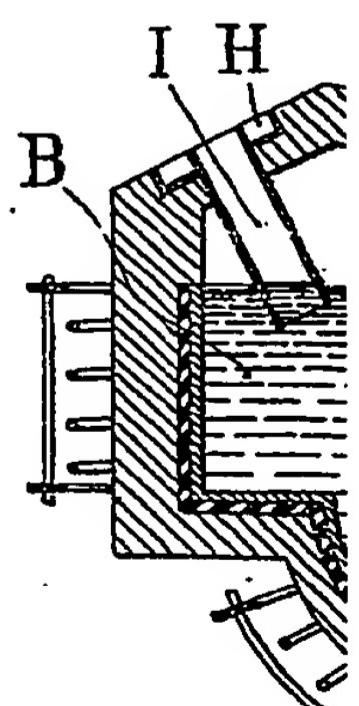
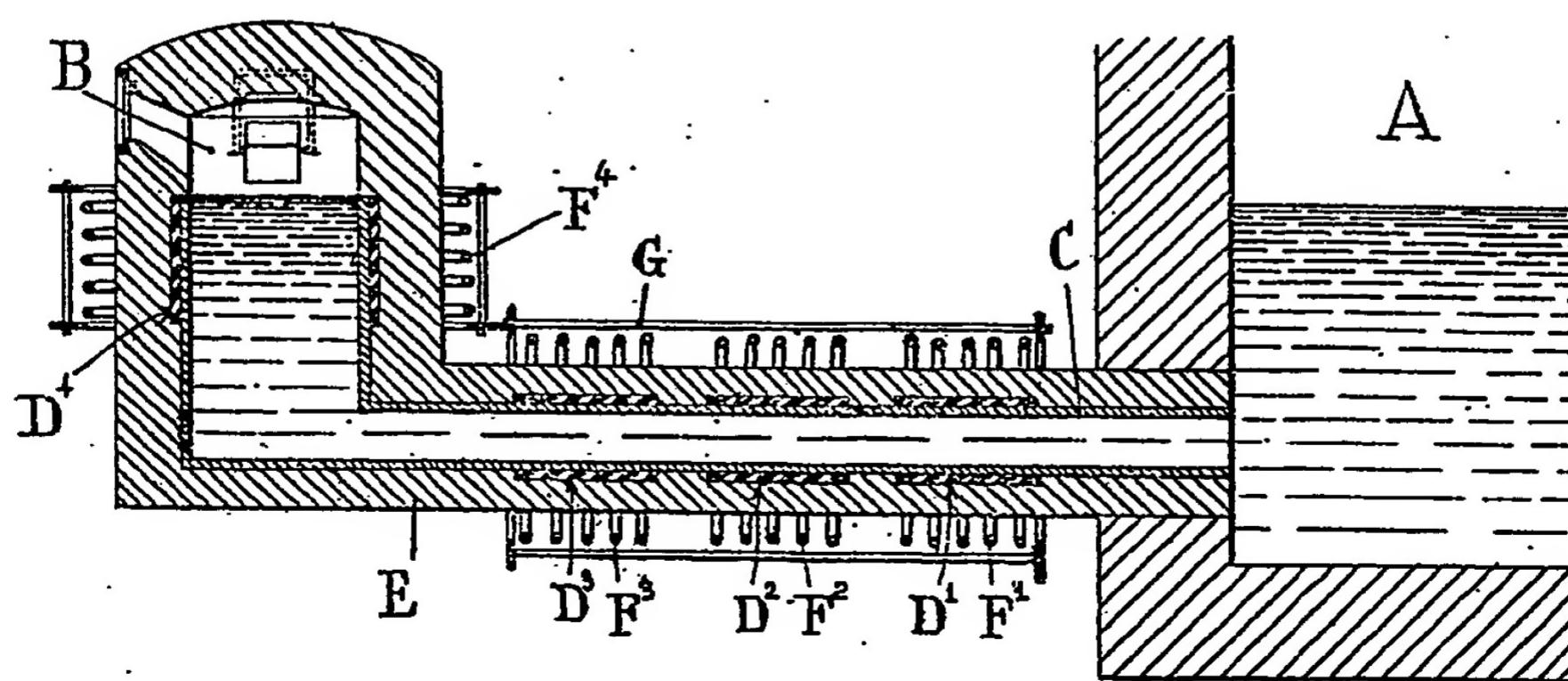


Fig.2.



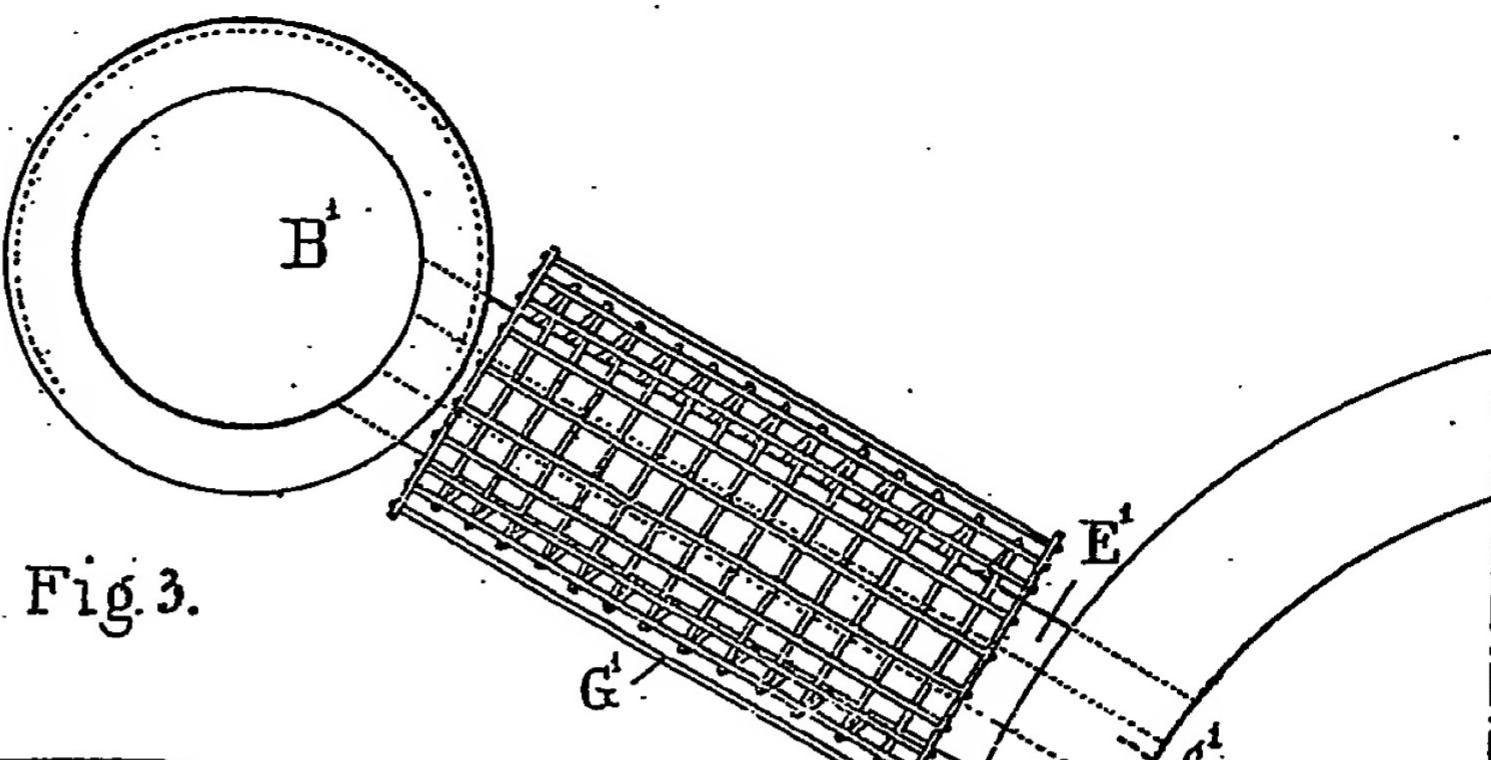


Fig. 3.

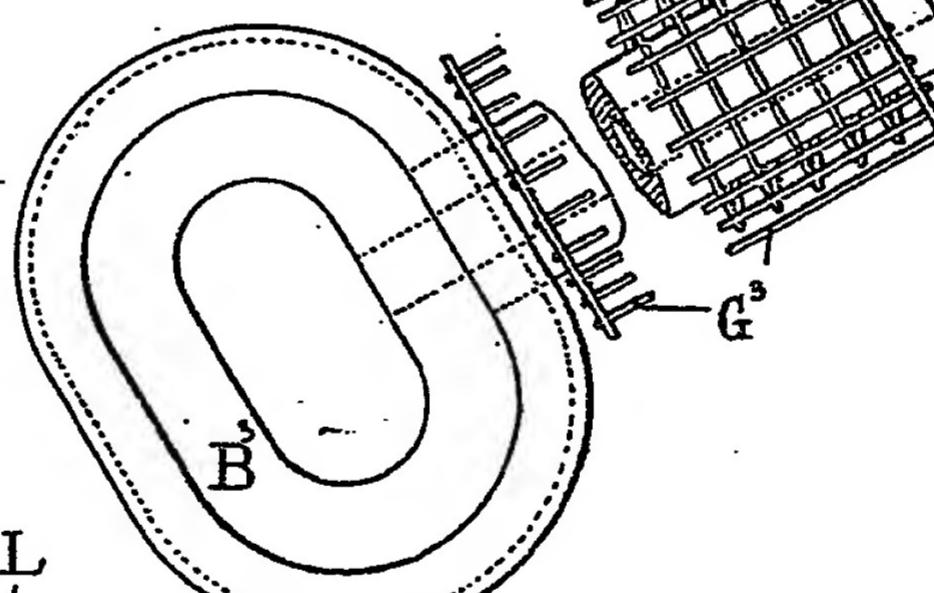
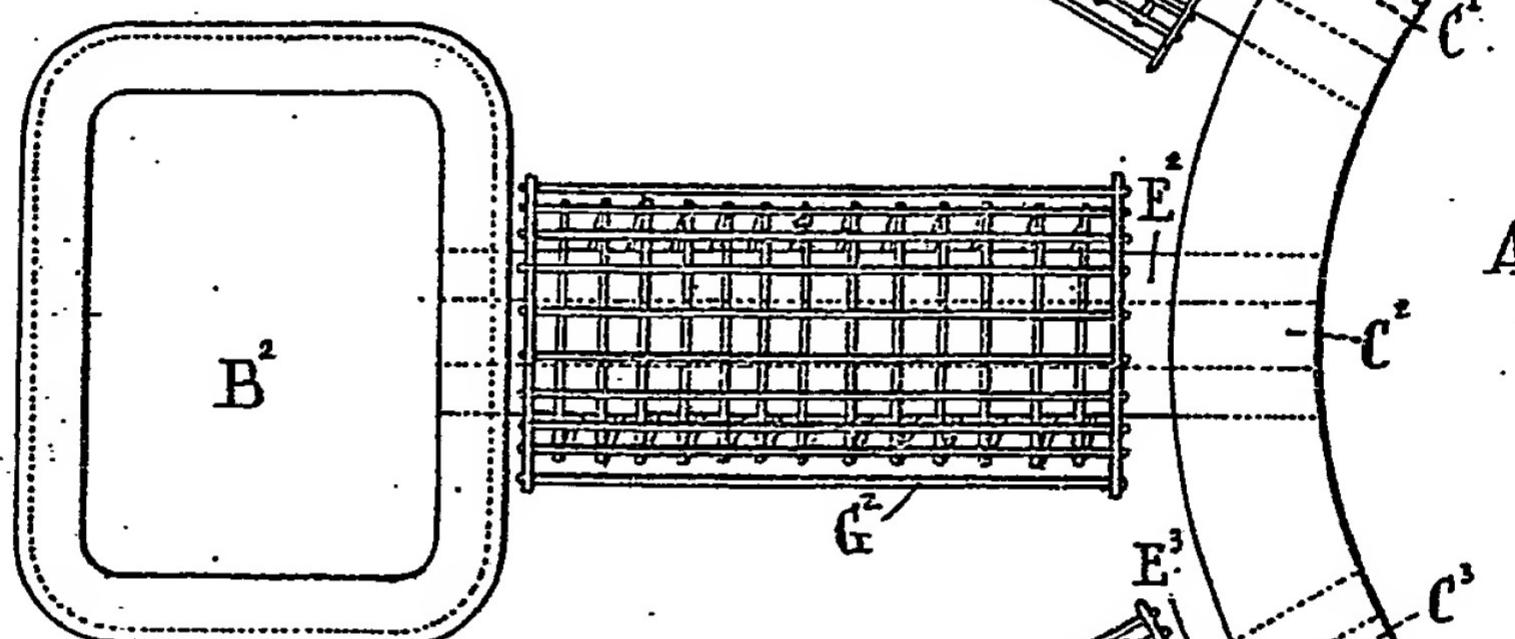


Fig. 4.

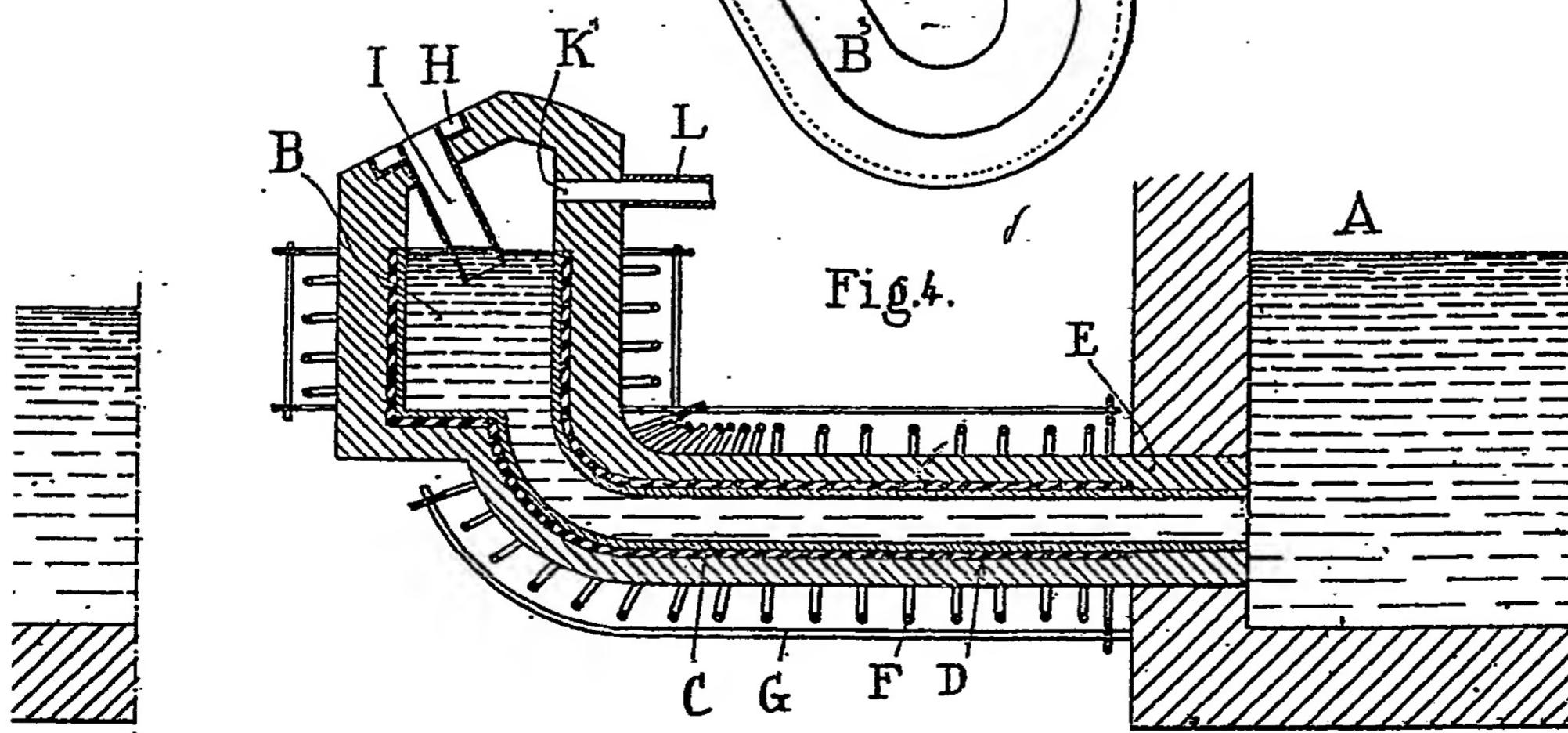


Fig.1.

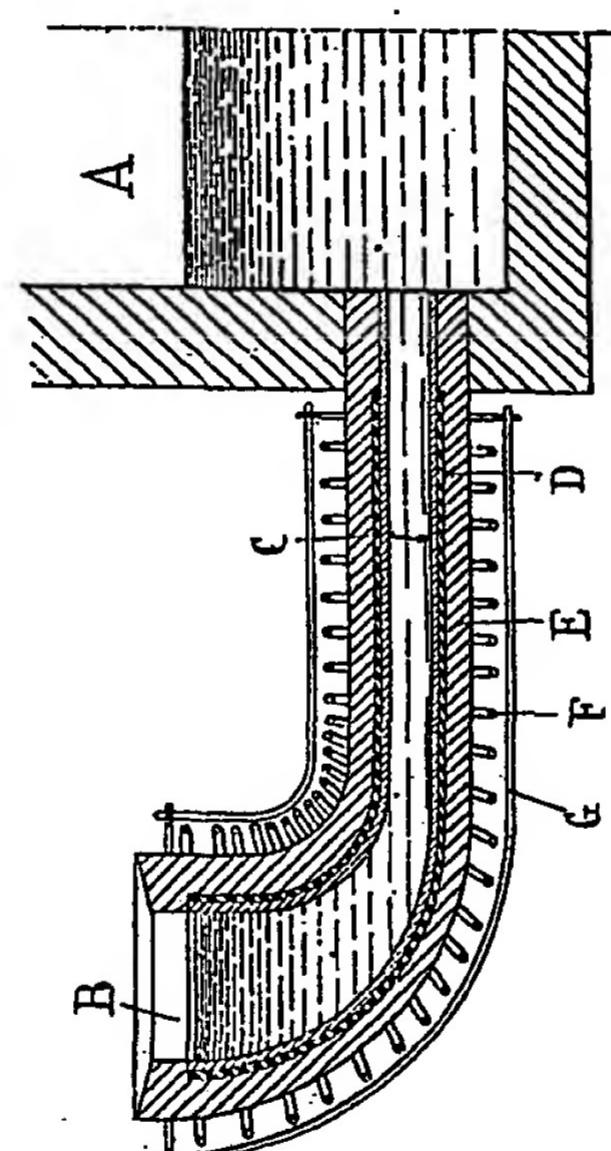


Fig. 2.

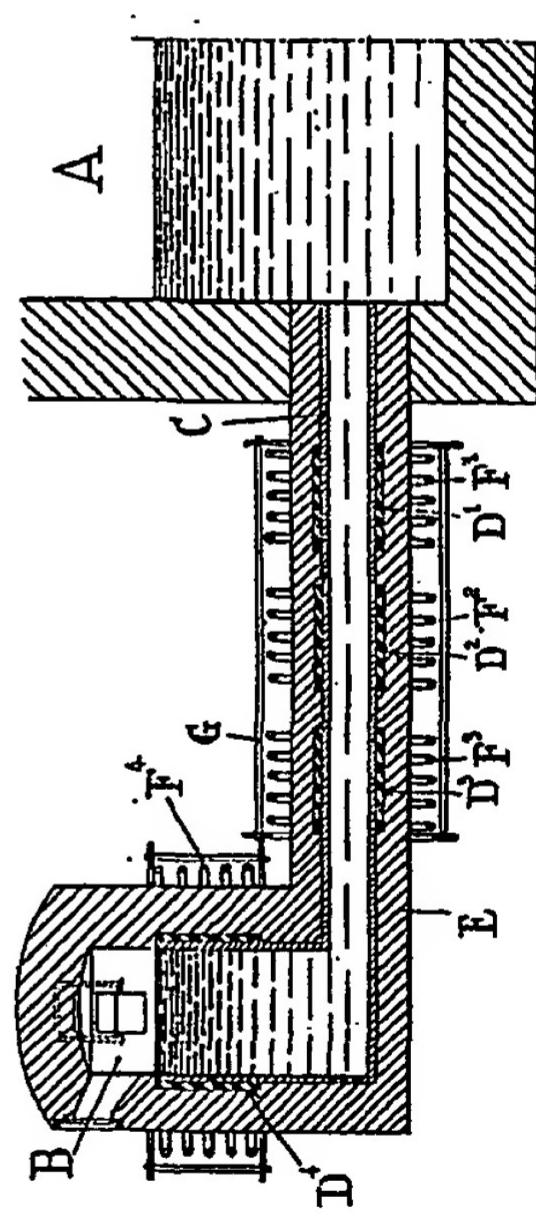


Fig.3.

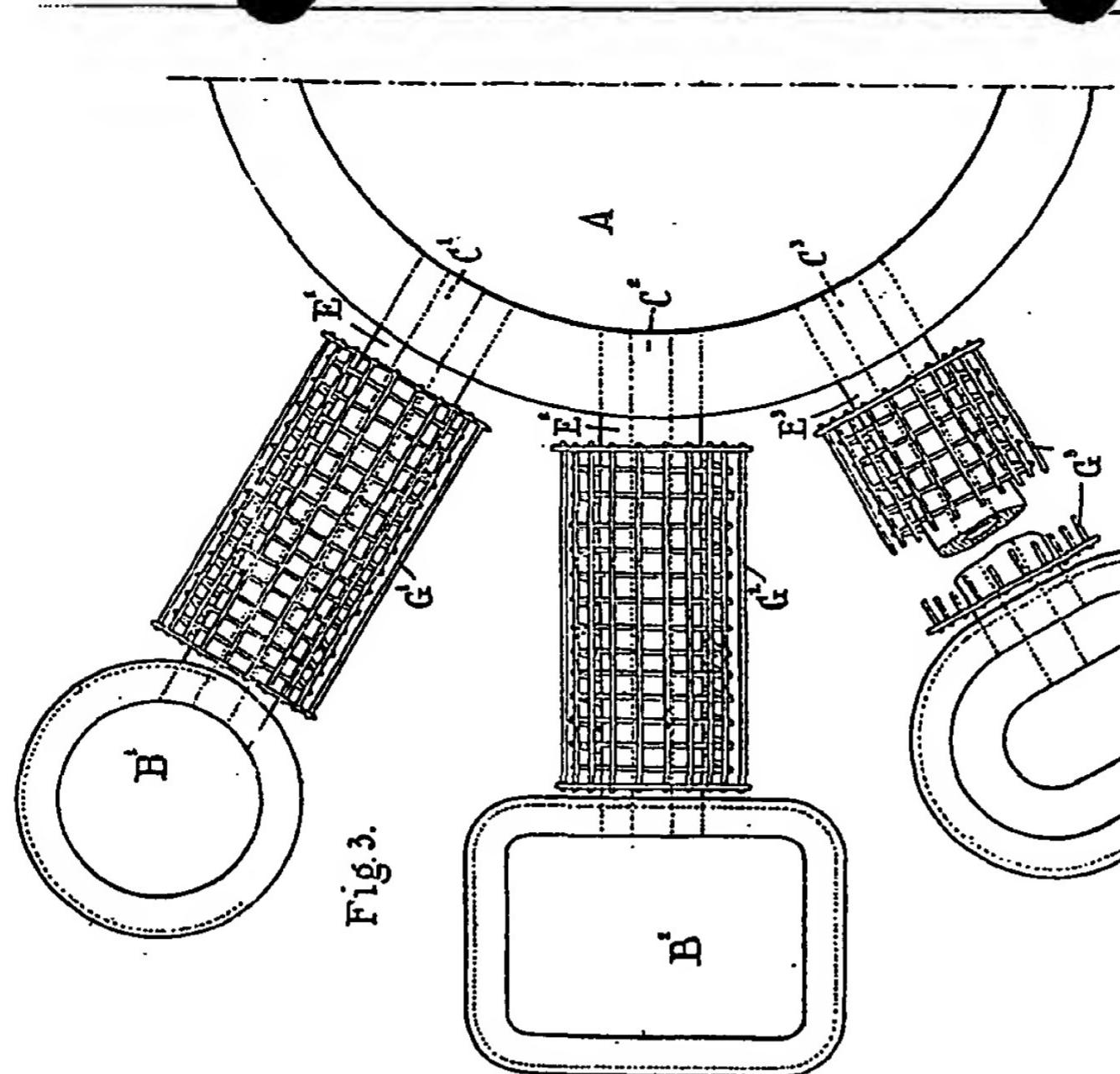
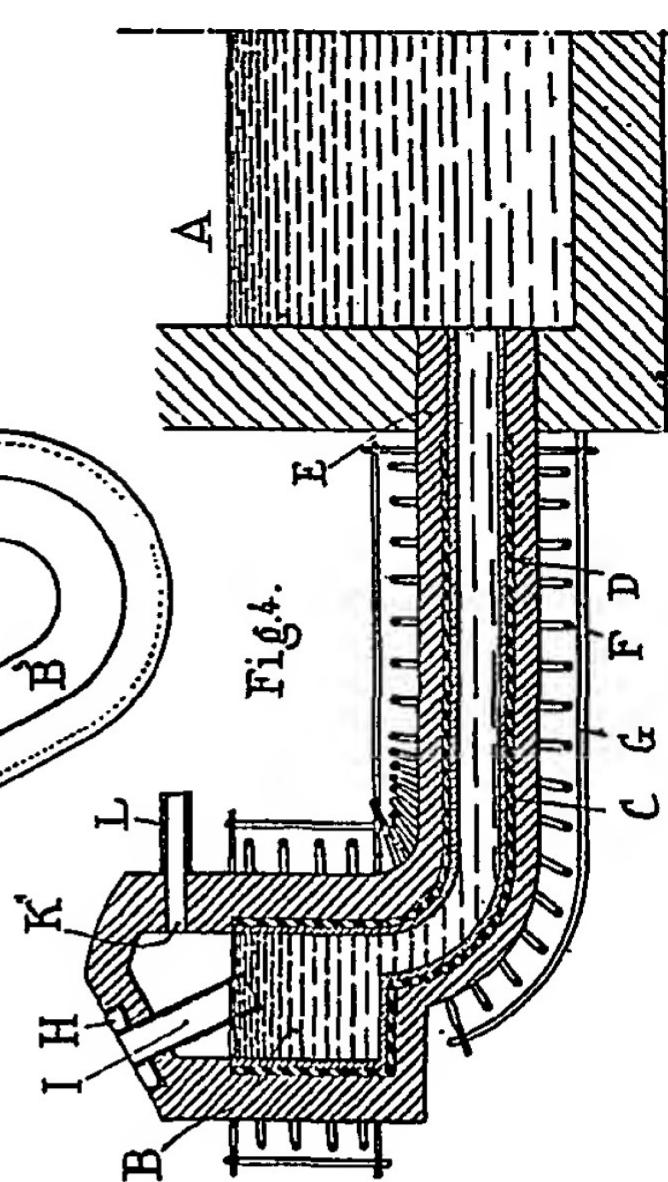


Fig.4.



(This Drawing is a reproduction of the Original on a reduced scale)